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METHOD OF WINTERTIME SPRINKLER DISTRIBUTION OF WASTE WATER (SPO--ETC(U)
APR 78 A S SHCHERBAKOV, L V MAL'KOV

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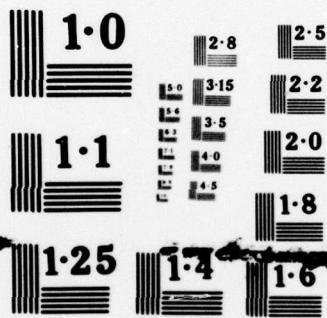
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See T.P.

A.S. Shcherbakov et al.

April 1978

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CORPS OF ENGINEERS, U.S. ARMY
COLD REGIONS RESEARCH AND ENGINEERING LABORATORY
HANOVER, NEW HAMPSHIRE

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METHOD OF WINTERTIME SPRINKLER DISTRIBUTION OF WASTE WATER

Kupavna SPOSOB RASPREDELENIYA STOCHNYKH VOD DOZHDEVANIYEM V ZIMNYEYE VREMYA
in Russian 1976 pp 1-5

[Prospectus by A. S. Shcherbakov, L. V. Mal'kov, A. A. Artem'yev,
N. D. Pyshkov, and V. A. Frolov, All-Union Scientific Research Institute
for Agricultural Utilization of Waste Water (VNIISV)]

The fertilizing value of waste water and its utilization on a year-round basis on irrigated farmland (IFL) is widely known.

In the course of the distribution of waste water on the fields through sprinkling, at below freezing air temperatures the water freezes and, in the course of the spring thawing period, the danger appears that the thawed waste water will be discharged from the fields and thus pollute surrounding waters.

The accumulation of waste water and its distribution in winter through other methods involves considerable capital outlays and technical difficulties. The specific nature of irrigation with waste water, particularly on the basis of a year-round system, calls for the creation of spraying systems with a maximum level of mechanization and automation of the irrigation process which could be achieved presently most completely through sprinkling.

The laboratory for the automation of spraying systems with the use of waste water of the VNIISV has elaborated a method for the distribution of waste water through sprinkling in wintertime reducing the outflow of thawed waste water from the irrigated lot and insures the even penetration of the thawed water in the soil along the entire irrigated sector.

This is achieved by distributing the sprinkled waste water at below freezing air temperatures not evenly on the entire area but only on the area where shafts of different configuration have frozen, distributed on the irrigated section where border strips have formed (a.s. No 480378).

The shape of the frozen shafts depends on the topography of the area, the sprinkling equipment used, the operational sequence and the design of the sprinklers.

This method for the distribution of waste water on irrigated fields in the winter may be implemented both through the use of DDN-70 sprinklers, as well as stationary sprinkling systems with single or group control of the sprinklers.

Unlike the dense summer irrigation, in the winter, at below freezing air temperatures, the sprinklers (DA-2 type) of the stationary sprinkling systems are turned on in a checkerboard sequence (every second sprinkler). The use of this method with stationary sprinkling systems is possible also through the utilization of special sprinklers for year-round irrigation with waste water and livestock farm effluents.

On the basis of the studies of serially produced sprinklers and of foreign designs the VNIISV has developed a special sprinkler (a.s. No 412943) for the year-round irrigation with waste and livestock effluents. The rotation of the machine is accomplished through the reactive action of the jet. The implementation of this method with the sprinkling apparatus (the freezing of shafts with the formation of closed basins) takes place by removing for the winter period the jet spraying system (close irrigation system). In other words, at below freezing air temperatures no close sprinkling takes place (see Figures 1-2). The ice coating is done when wind velocity does not exceed 2.5 meters per second.

In the spring the shafts of waste water ice are gradually thawed (thawing is up to 10 days slower compared with unirrigated section) and the bulk of the thawed waste water penetrates the soil through the basins created by the ice.

The use of this method for the distribution of waste water through sprinkling in the winter offers the following advantages:

The distribution of waste water by sprinkling below freezing air temperatures with a reduced thawing loss becomes possible;

The size of the storing areas for the accumulated waste water is reduced;

The sprinkling equipment for waste water is used on a year-round basis;

Conditions for the storing of moisture and fertilizers in the soil improve;

The possibility develops for the use of mechanization and automation in the year-round distribution of waste water, which improves environmental protection conditions and lowers the cost of utilization of waste water.

Personnel from the Laboratory for Automation of Sprinkling Systems using waste water of the VNIISV participated in the development of this method and its experimentation over a 2-hectare lot (experimental stationary system).

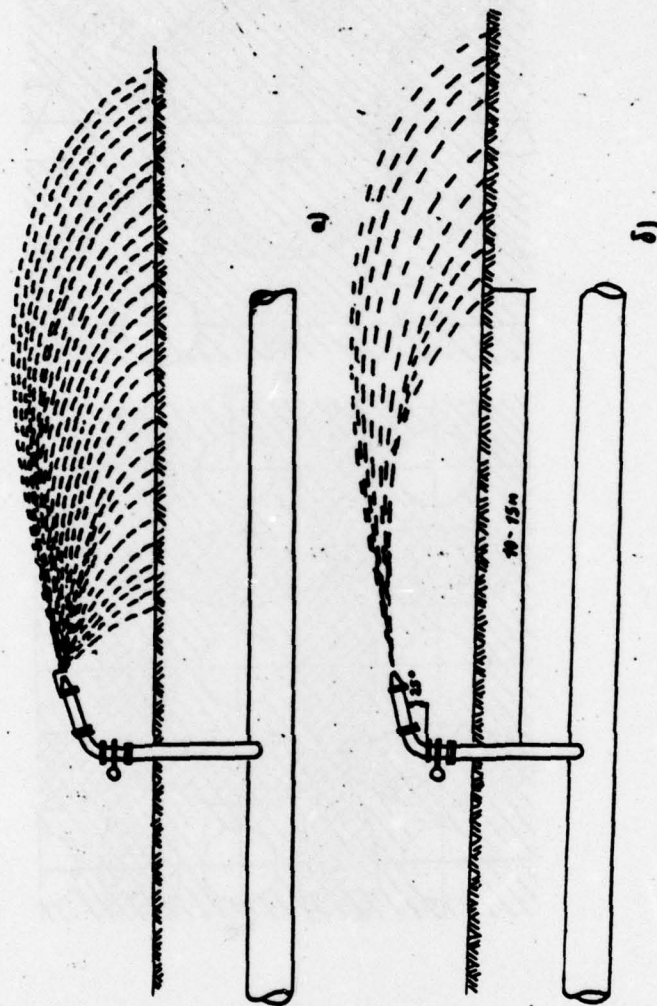
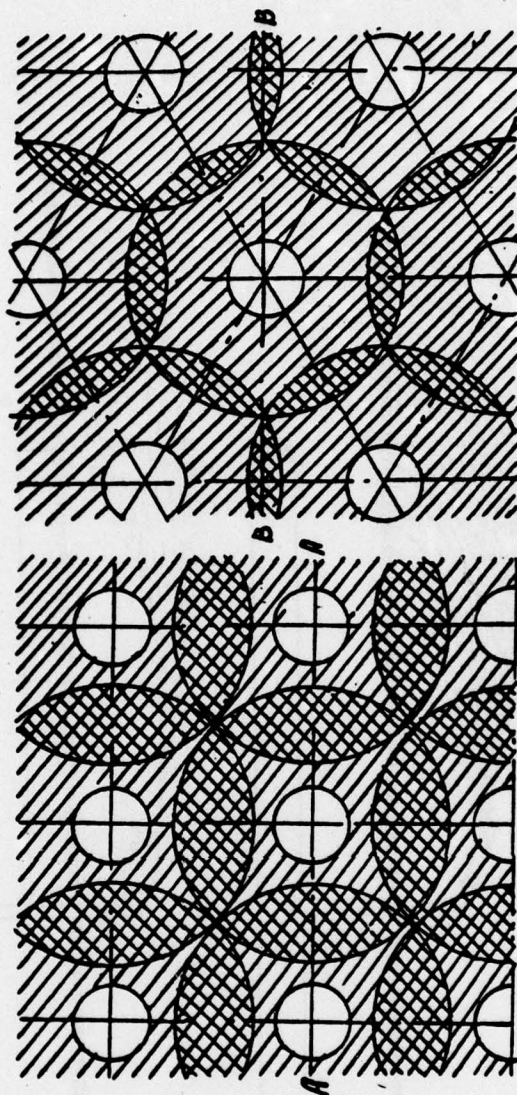


Рис. 1. Схема работы дождевального аппарата при намораживании сточных вод
 а) легкий полив
 б) полив при отрицательных температурах воздуха -
 намораживание сточных вод



по В-В

по А-А

Рис. 2. Схема намораживания сточных вод дождеванием